Quality Improvement of a Garment Industry in Myanmar using Total Quality Management Tools

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Abstract

Myanmar's garment industry is one of the most important sectors for sustainable development and creates a number of formal jobs for women. The Myanmar Garment Manufacturers Association estimates that its nearly 600 member factories employ approximately 500,000 workers. The combination of inexpensive labour and strict adherence to product quality are two important factors that make Myanmar an attractive place to outsource for garment products. Profitability of the garment industry depends on the productivity and quality improvement. Therefore, the quality improvement is vital in a garment industry. This paper is about the study on the quality of puffer jacket production in Zhejiang Clothing Co., Ltd. The main aim of this paper is to improve the product quality using total quality management (TQM) tools (Check sheet, Histogram, Pareto chart, cause and effect diagram). Case study methodology was applied step-by-step procedure. Data Collection and observation were done in the selected production line where the most defects were found. Then the TQM tools were applied to reduce the defects for the product quality improvement. After applying the proposed methodology, the Defect per hundred-unit (DHU) percentages were compared in terms of initial and final states and it was analyzed that there was a 66.762% decrease in Defect per hundred unit (DHU). These observations indicate that an industry can achieve increase productivity by improving quality constraints by minimizing rework activities.

Keywords

Quality improvement, Defect, TQM tools, DHU, Rework activities.

1. Introduction

Myanmar's garment industry has established itself as an important engine for sustainable development. Myanmar has received orders from international retailers such as Adidas, Gap, H&M and Marks & Spencer. Leading the country's manufactured goods export sector, Myanmar's apparel exports increased from US $ 349 million in 2010 to almost US $4.6 billion in 2018, which represents about 10 percent of export earnings of the country. The country mainly exports CMP (Cut-Make-Pack) products to Japan, followed by several European countries, South Korea, the USA and China. According to the government data, roughly 65 percent of the total investment companies in the sector is China. The Myanmar Garment Manufacturers Association estimates that its nearly 600 members factories provide jobs for approximately 500,000 workers. The majority of these workers are young women, so empowering them is very important. Production line efficiency is lower than the competitors in neighboring ASEAN nations. Garment industries in Myanmar are facing low productivity, long production lead-time, and low salary. Quality improvement and productivity are very important factors of garment manufacturing industry in competitive market environment. Garment Industries are always trying to improve their production and quality. There are many ways to improve the quality and productivity in garment industry [1].

Quality improvement (QI) is the framework used to systematically improve processes and systems [2]. Quality improvement is a systematic approach to avoid or reduce rework, rejects and losses in the production process. Quality improvement aims to create efficiency and meet customer needs. There are 9 steps to quality improvement, namely (i) List and prioritize improvement opportunities (ii) Define improvement goals (iii) Define requirements (iv) Collect and organize data (v) Select causes (vi) Generate possible solutions (vii) Select best solutions (viii) Implement the solution and evaluate the results (ix) Continue searching [3]. Total Quality Management (TQM) is an ongoing process for identifying and reducing or eliminating manufacturing defects, streamlining supply chain management, improving the customer experience, and ensuring employees get training quickly. This approach focuses on exceeding customer expectations, identifying problems, building engagement, and promoting open decision-making among

employees. And then, the focus of total quality management is to improve the quality of an organization's outputs, including goods and services, through the continual improvement of internal practices. Total Quality Management aims to hold all parties involved in the production process responsible for the overall quality of the end product or service. There are many key principles of TQM. They are customer orientation, employee engagement, process-centered, integrated system, strategic and systematic approach, fact-based decision-making, communication and continuous improvement [4]. There are eight principals of total quality management, Customer focus, Leadership, Involvement of People, Process Approach, System approach to management, continuous Improvement, Factual approach to decision Making and Manual beneficial supplier relationship. There are seven basic techniques of total quality management. These are (i) flow chart (ii) Histogram (iii) cause-and-effect diagram (iv) check sheet (v) scatter diagram (vi) control chart (vii) pareto chart [5]. This study will emphasize on check sheet, histogram, pareto chart, cause and effect diagram for the quality improvement. The contribution of this paper is how to apply TQM tools for the quality improvement of garment production line. The paper will be provided empirical solutions of puffer jacket production line of Zhejiang Clothing Co., Ltd. for the quality improvement. The factory can expand to other production lines for the quality improvement.

2. Literature Review

Quality is fitness for use and conformance to specifications and producing the very best products and excellence in products and services. Quality is totally a customer satisfaction and exceeding customer expectations. Quality may be thought to have two main divisions: the quality of a manufactured product and the quality of service received. From a manufacturing standpoint quality is simply a conformance to specifications. The ultimate customer could describe quality as fitness for use.

Quality improvement is to change or to get rid of parts of the process that do not work well. MD Faisal Hanif, Halima Tus Sadia and Mehedi Hasan Chain (2020) studied the quality improvement in readymade garments industry by traffic light system. The study focuses on high quality products at minimum cost. Reducing such waste can be a profitable option for the manufacture as well as buyers. A traffic light system was implemented to minimize the defect rates of production. That study shows that the average error rate drops from 4.13 to 1.25 pieces with eight hours of daily production. The main purpose is to raise the quality and production saving lead-time and makes better the supply chain performance [6]. M.M. Rahman and A.K.M. Masud et.al studied the quality improvement in garments industry through TQM Approach. The study focuses on the improvement quality and reduces manufacturing cost by reducing rework and scrape. TQM methods are widely used in the RMG area. Several implementations have proven that the TQM approach actually works in practice and in some situations even increases quality levels by 90% or more. The RMG sector is a large industrial sector in Bangladesh, Quality improvement can play an important role in increasing productivity as well as the economic development of the country. The main purpose of this study is to improve the product and process quality by using the TQM tools, which can give remarkable improvement by reducing defect. The objective of this research is to identify the basic pillars required to implement TQM in practice and to improve the quality of a garment industry of Bangladesh by implementing TQM approach. The methodology of this research is firstly, an extensive literature review conducted to identify the pillars required to implement TQM in practice. Secondly, conduct an analysis of product to find the current status [7]. A.M Amirul studied that Quality Management System in Garment Manufacturing. The study focuses on customer requirement and satisfaction through combine effort of the whole organization management by setting up a work standard. The main aim is to meet buyer requirements and improve its effectiveness and efficiency on a continuous basis quality control and improvement. Mazharul Islam Kiron studied the Quality control system in Garment industry. The main aim of this paper is to understand, establish & accept the customer's quality requirements. The objective of this paper is to maximize the production of goods within the specified tolerances correctly the first time and to achieve a satisfactory design of the fabric or garment in relation to the level of choice in design, styles, colours, suitability of components and fitness of product for the market [8]. Mohammad Faizur Rahman and G.A. Chowdhury studied the Quality Management in Garment Industry of Bangladesh. The study focuses on the product quality calculation in term of quality and standard of fibers, yarns, fabric construction, color fatness, designs and the final finished garments. 5 S (Sort, set in order, Shine, Standardize, Sustain), DWM (Daily Work Management) and Six Sigma were used in this paper [9]. Aemon Saleem studied the quality management system in garment industry. The paper is focused on the ensuring efficiency and perfection in all processes ranging from product design and development to selling and after-sales service. The objective of this research is to make sure that the customers get the best quality product and can attain the maximum utility from buying that product. This research uses the quality management system that is a series of interdependent and interlinked techniques that aim at achieving the maximum level of satisfaction [10]. Nitesh Sahoo studied the efficiency improvement by reducing rework and rejection on the shop floor. The paper is focus on the quality improvement of garment industry by applying the quality tools such as checklist, cause and effect diagram and traffic

light system. The purpose of this research is to reduce the reworks rate with improved quality by eliminating the loopholes of quality and provide the guidelines to control the rejection and rework through reduction of defect in garment industry by identifying the root causes and traffic light system. [11]

3. Research Methodology

In this study, quality management system tools are applied to improve the quality. Among the seven-quality control tools, check sheet, histogram, pareto chart, cause and effect diagram were applied for the quality improvement. Methodology is considered a step-by step procedure as shown in Figure 1. Firstly, the existing literatures were reviewed and the ideas were developed for quality improvement. After that the ideas were gathered to apply for the quality improvement. And then the puffer jacket production line of the garment factory was selected for this research work. The defective data were collected using the check sheet. After that the histogram was drawn to determine the hierarchical defect and the pareto chart was drawn to show the cumulative defect frequency and determine how many defective factors have to be analyzed for the targeted improvement. And then cause and effect diagrams were drawn to analyze the root causes of the problems. Finally, the root causes of the problems were solved and the product quality was improved.

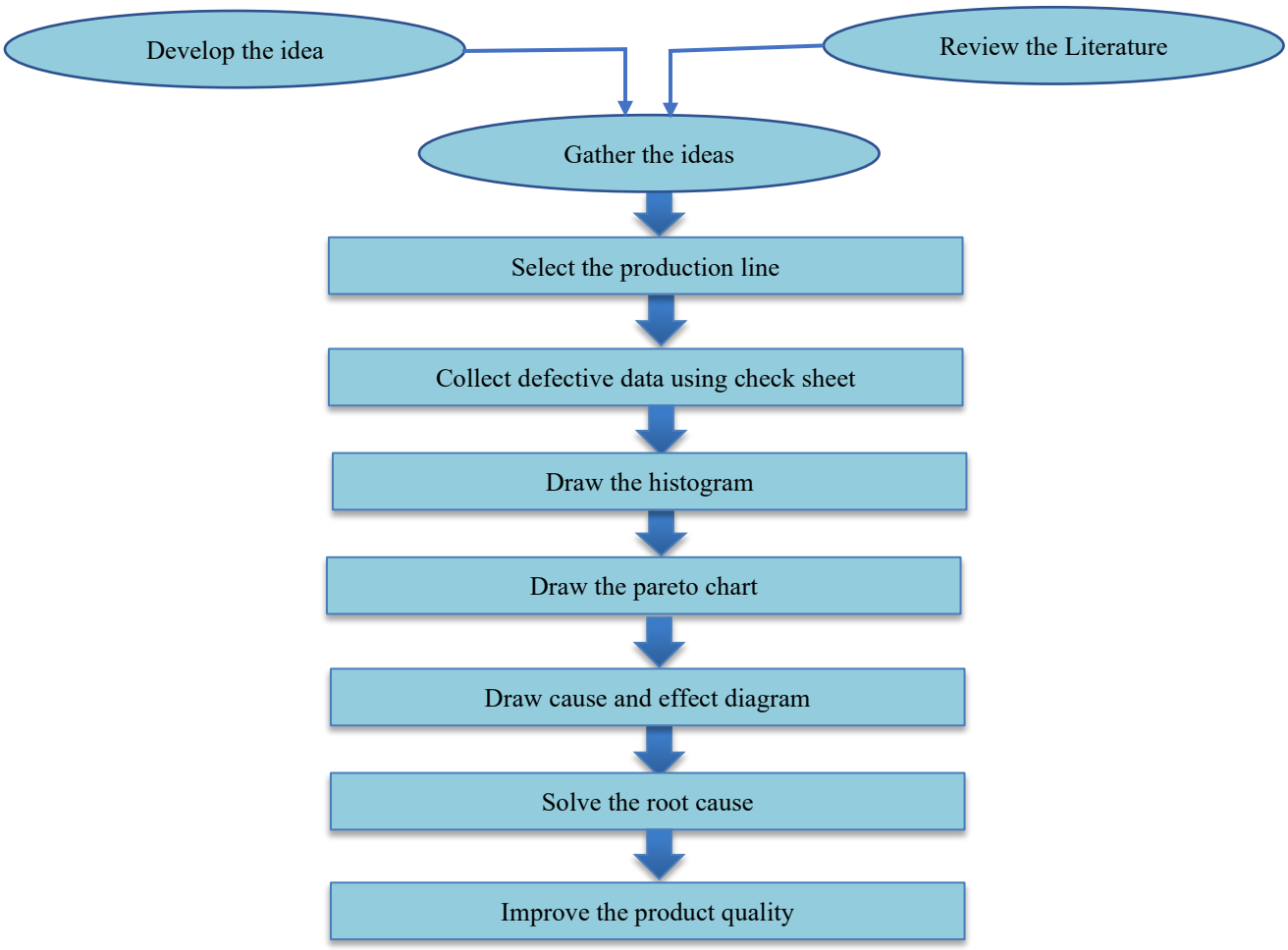

Figure 1. Research Methodology Flow Chart.

4. Data Collection and Observations

One of the garment factories from Myanmar was selected for the practical implementation of this research work. It has 35 sewing lines and 2729 workers and it is located in Shwe Lin Pan Industrial Zone, Hlaing Thar Yar Township, in Yangon. For this research work, the puffer jacket production line was selected. There are about 24 operations in the research product. The defect data of the puffer jacket was collected with the check sheet according

to the defective categories. There are nine defective categories as shown in Table 1. The ten days defect data was collected in the selected production line. The check sheet, also known as the "Disability Concentration Diagram", is basically a data collection sheet. By using check sheet, the frequency of defects and the defect per hundred unit (DHU) of these ten days were calculated. After using the check sheet, the number of defect and the defect categories were used to draw the histogram to know the hierarchical defect as shown in Figure 2. A histogram is a bar graph with a measurement scale on one axis and a frequency or percentage scale on the other. The histogram is a picture of a frequency distribution and is generally used to show the distribution pattern of a large sample of data. The histogram is based on the defect categories and number of defects. After drawing the histogram, the number of defect and cumulated defect percentage were calculated to draw the pareto chart as shown in Table 2. A Pareto chart is a bar chart that ranks problems in descending order of frequency. It uses the pareto principle the idea that by doing 20% of work, 80 % of the advantage of doing the entire job can be generated. In term of quality improvement, a large majority of problems (80%) are produced by a cause few key causes (20%). According to the pareto chart as shown in Figure 3, 40% of defects come from the two defective factors which are the low and high edge of the collar is not equal and the placket size on the collar is not equal. So, these two defective factors were analyzed by using cause and effect diagram to identify the root cause of the problems as shown in Figure 4 and Figure 5. Cause and Effect diagram is a chart that identifies the potential causes for quality problems. This chart is often known as the fishbone diagram. The potential causes are related to method, environment, manpower, machine and material. The root causes of the problems of two defective factors were identified and took corrective action to solve the root cause as shown in Table 3 and Table 4. After solving the root causes, DHU were decreased.

Table 1. The Check Sheet for Data collection
(From 1.9.2021 to 11.9.2021) (defect categories of Puffer jacket)

No	Defect categories	Days										Total
		1	2	3	4	5	6	7	8	9	10	
1	The Placket size on the collar is not equal	11	9	6	3		4	3			1	37
2	The low and high edge of the collar is not equal	10	9	6	4		2	2		3	3	39
3	The Zipper contort	5				2		3	2			12
4	Vacate the piping				3	2				1		6
5	The thread skips of hood stitch					4	4	3		2	1	14
6	The two-pocket size on each other is not equal				5	4	3	3	3	2		20
7	The hemline contorts	7	6	5					4		3	25
8	The mouth of the pocket causes the gap	5		4	2	3			3	2	2	21
9	Fitting the inverse of the label				2	3	5	3	3	2		
Total Defects		38	24	21	19	18	18	17	15	12	10	
Inspection		100	100	110	110	110	110	120	120	120	120	
Passed		62	76	89	91	92	103	105	108	110		
Defect Percentage		38%	24%	19%	17%	16%	16%	14%	13%	10%	8%	
DHU		17.143										

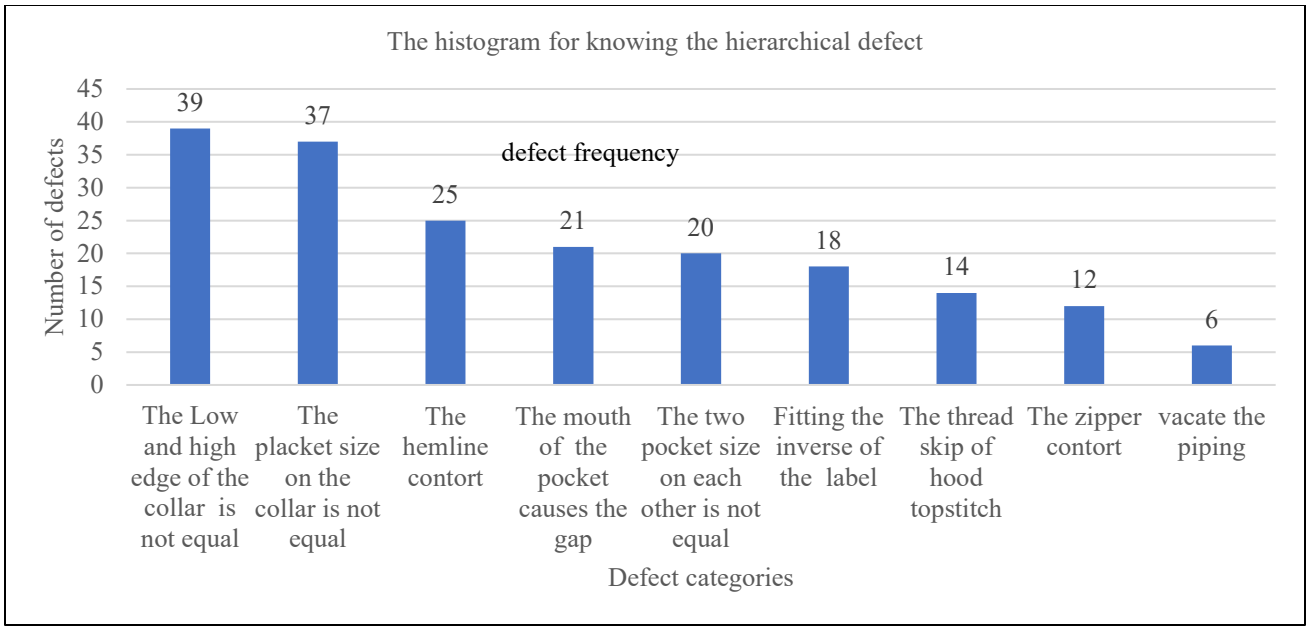

Figure 2. The Histogram for knowing the hierarchical defect

Table 2. The Calculation for drawing the Pareto Chart

No	Defect categories	Defect Frequency	Percentage of all shirt	Cumulative %
1	The low and high edge of the collar is not equal	39	20.31%	20.31%
2	The placket size on the collar is not equal	37	19.27%	39.58%
3	The hemline contorts	25	13.02%	52.6%
4	The mouth of the pocket causes the gap	21	10.94%	63.54%
5	The two-pocket size on each other is not equal	20	10.42%	73.96%
6	Fitting the inverse of the label	18	9.38%	83.34%
7	The thread skips of hood topstitch	14	7.29%	90.63%
8	The Zipper contort	12	6.25%	96.88%
9	Vacate the piping	6	3.13%	100%
Total		192	100%	

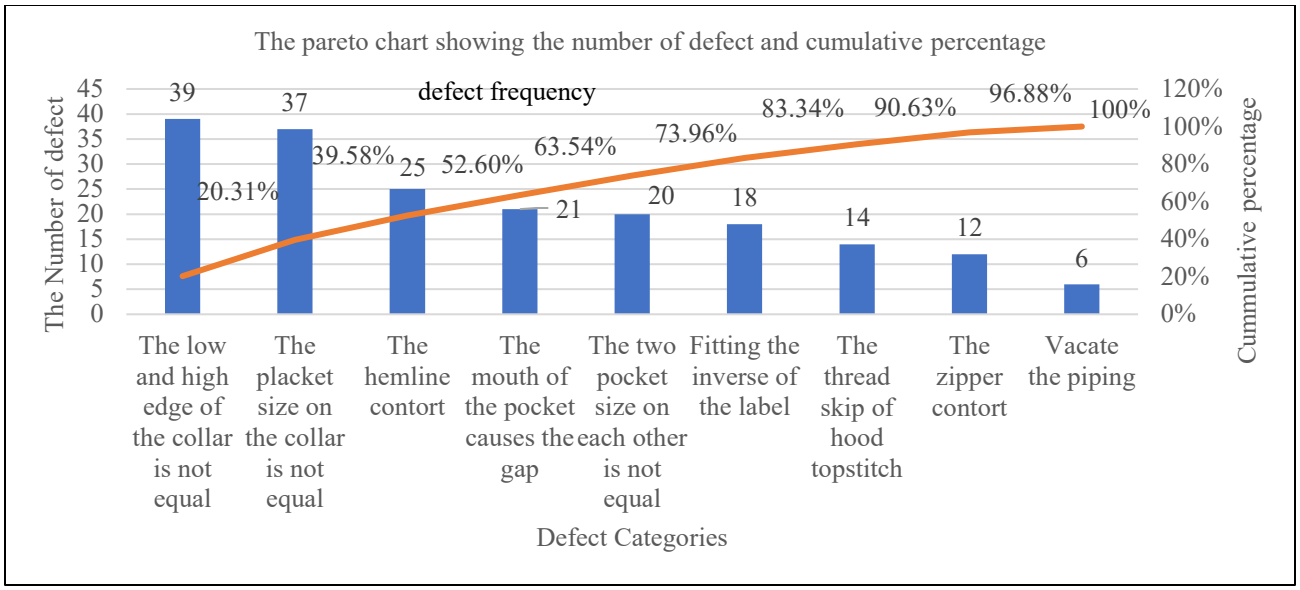

Figure 3. The Pareto Chart Showing the number of defect and the cumulative Percentage for 10 days

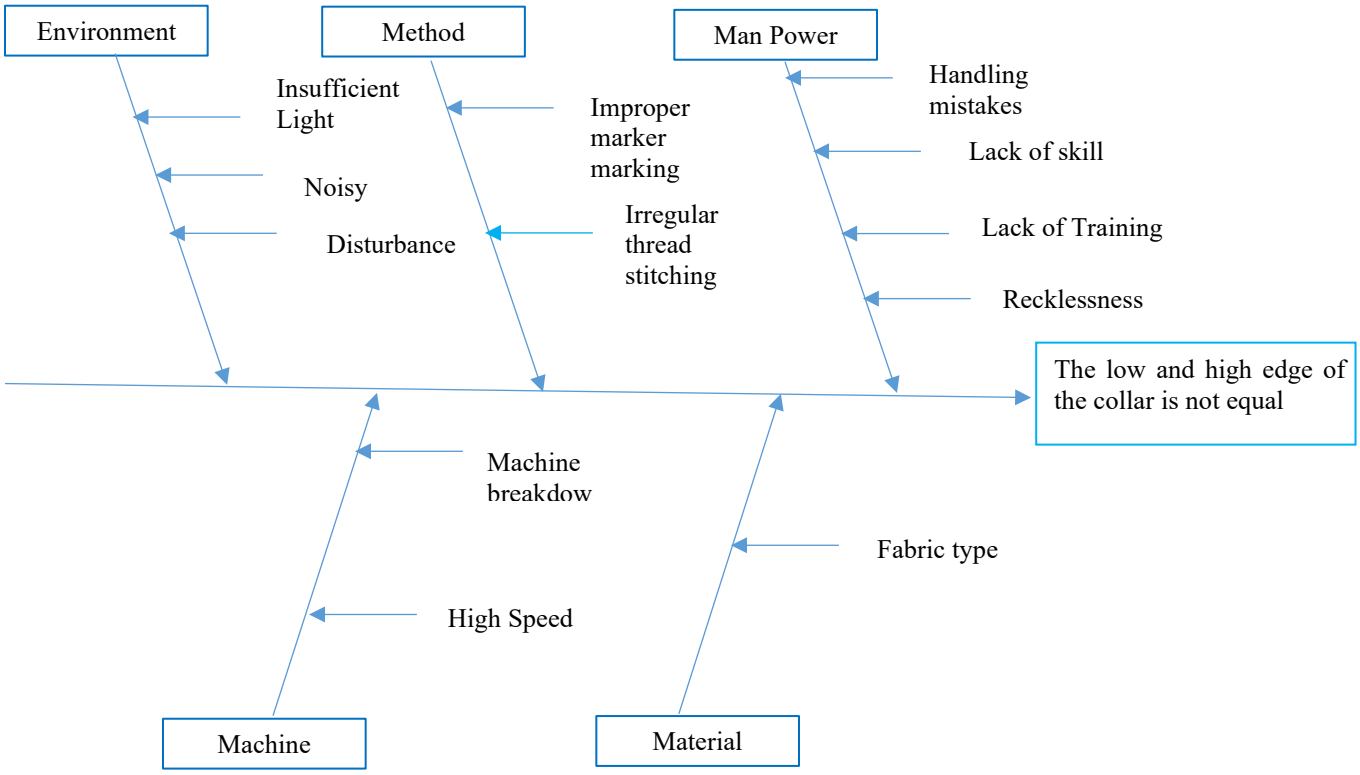

Figure 4. The Cause-and-effect Diagram for the low and high edge of the collar is not equal defective factor

Table 3. The Solution of low and high edge of the collar is not equal defective factor

Causes	Action Taken /Implementation
Man Power	Factory provides the necessary training to operators such as material handling to improve the skill.
Method	The body of the jacket is fold equally and made the proper marking. The neck of the collar is folded equally and marked proper marking. Then stitch the coincidence marking line of the jacket's body and the neck of the collar.
Machine	Maintenance workers adjust the speed of machine according to the operation and fabric. The machine is maintained regularly.
Material	Factory selects the good quality of fabric and inspects the fabric quality carefully.
Environment	Workplace must have sufficient light. The Supervisor should notice the operator and helper to work in the workplace quietly and handle the disturbances.

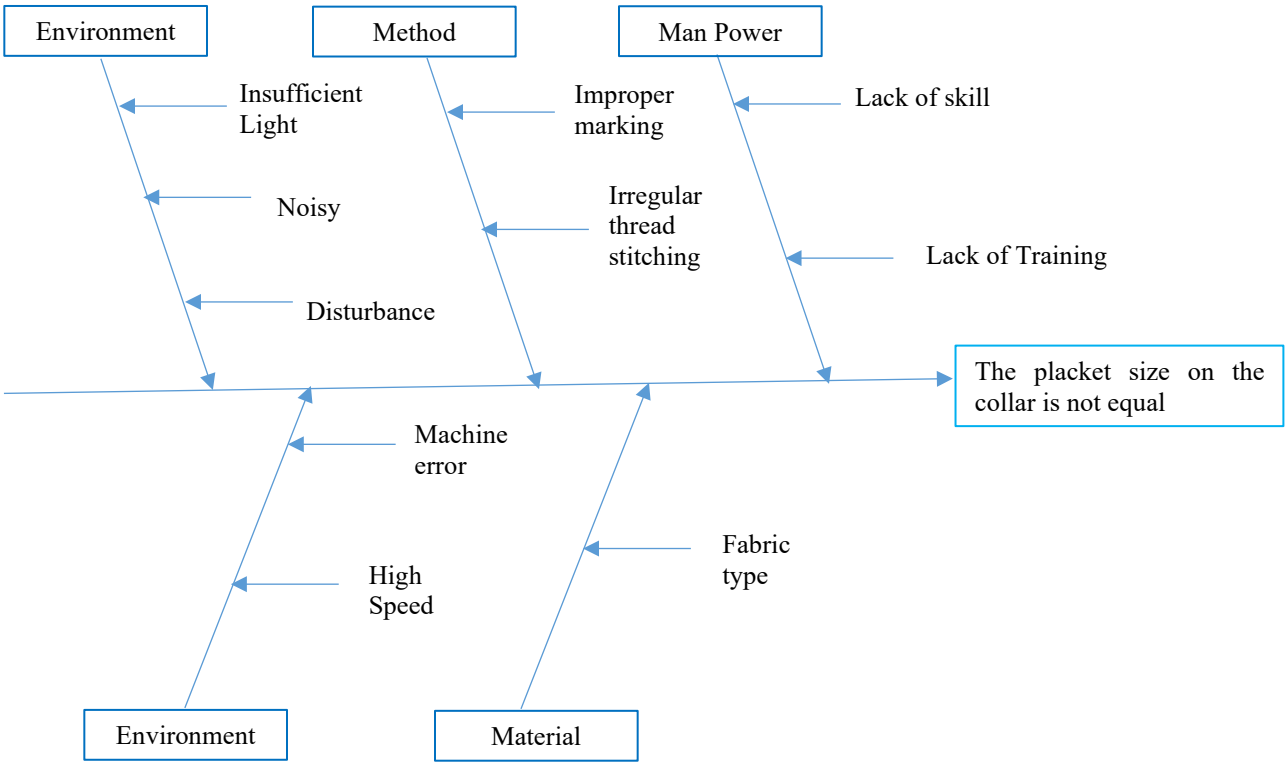

Figure 5. Cause and effect diagram for the placket size on the collar is not equal defective factor

Table 4. The Solution of the placket size on the collar is not equal defective factor

Causes	Action Taken
Man Power	Factory provides the necessary training to operator to improve the skill.
Machine	Maintenance department repairs the damage machine parts regularly and install the right needle.
Method	Operator put the pattern on the placket and makes the marking.
Material	Factory selects the good quality thread, which is free from flaws.
Environment	The bulbs are needed to assemble in the working place. The supervisor should notice the operator and helper to work in the workplace quietly and handle the disturbances.

5. Results and Discussion

The defect per hundred-unit (DHU) percentages for the initial state is 17.143. After taking the action for the quality improvement, DHU is decreased to 5.698. According to the ten days defect data after taking the corrective action, the defect frequency of the low and high edge of collar is not equal is decreased from 39 to 0. Then, the defect frequency of the placket size on the collar is not equal is decreased from 37 to 19. The other defective factors that are 14 defect frequency of the hemline contorts, 19 defect frequency of the sticker missing and 20 defect frequency of the sleeve turning point is not correct become the highest defect frequency. So, quality improvement procedures have to be done again to continue quality improvement. The decrease percentage of defect after using quality control tools is 66.762%. The defect rates are decreased significantly and the productivity and line efficiency also are increased.

6. Conclusion

The paper is focused on the quality improvement in readymade garment industry by using the total quality management tools. Total Quality Management (TQM) is also referred to as total productive maintenance and is the approach of the management to achieve long-term success by focusing on customer satisfaction and then the organization works towards a steady improvement in the quality at all stages of production. By focusing on customer, the organization could not survive without continuous improvement in their product quality and process in today's competitive market. The profitability of the industry largely depends on the quality imporvement. The percent decrease of DHU was 66.762% if intial state and final state are compared. The producitity and line efficiency are increased. After applying the quality control tools in the quality improvement of garment production line, it will improve not only for the product quality but also the productivity of the industry. This study shows that the quality improvement can be achieved by reducing the defect and rework times.

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Biographies

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